

# MOBILE LEARNING AND ACHIEVEMENT GOAL ORIENTATION PROFILES

Minna Asplund

*Software Engineering / Lahti University of Applied Sciences, Finland*

## ABSTRACT

Students with different achievement goal orientations have different approaches towards learning and studying. There is a widespread interest to find an easy access into learning spaces for those students who have low motivation with fear of failure and academic withdrawal. Mobile learning offers an easily accessible chance with low threshold to view materials and to carry out mobile assignments. The topic of this cases study was to investigate different achievement goal orientation profiles combined with mobile learning. The aim of the study was to reveal if any correlation could be found between students' achievement goal orientation profiles and results from mobile assignments students did with smartphones on the course "The basics of databases". The sample consisted of students in the second academic year (N=173) at the Faculty of Technology at Lahti University of Applied Sciences in Finland, of whom 64.7% had an achievement goal orientation profile (n=112). The results of the study imply that no difference can be found between orientation profiles and outcome from mobile assignments. Contrary to what was expected, students with a positive orientation profile (mastery-oriented and success-oriented) did not get any better results from mobile assignments than students with a negative orientation profile (avoidance-oriented). This in turn implies that students with an avoidance-oriented profile could benefit from mobile assignments.

## KEYWORDS

Mobile assignment, m-questionnaire, achievement goal orientation profile, motivation

## 1. INTRODUCTION

Lahti University of Applied Sciences (LUAS) is a multidisciplinary higher education institution. The Faculty of Technology operates in the field of technology and engineering. Teachers in the Department of Information Technology have noticed that the number of students who lack studying motivation has increased. It can be seen in a variety of ways. For example, students do not come into examinations, do not come to school, do not hand in essays in time, do not value the engineering program, and sometimes in classroom situations the teacher's authority is at a very low level (Veijalainen et al., 2013).

At the end of 2008 there were 6.9 million mobile phone subscriptions in Finland (OSF, 2009). As the latest population figure in Finland is about 5.4 million (OSF, 2013) it is presumable that every student has a mobile phone at hand. Mobile phones provide a learning environment which is omnipresent and free from time and space limitations. For those students who might have low studying motivation and who struggle with their studies, a mobile phone could be one tool to keep up.

The aim of this research was to study whether there is any kind of correlation between students' orientation profiles and results obtained from mobile assignments. It is also interesting to see if any correlation can be found between the results of mobile assignments and other background variables.

## 2. BACKGROUND

### 2.1 Achievement Goal Orientation and Additional Motivational Indices

Achievement goal orientations, in other words orientations related to learning and performance, reflect on how students orientate themselves towards learning and studying, what kind of goals they endeavor, and

what kind of final results they aim at (Tuominen-Soini et al., 2010). Goal orientations refer to a disposition that manifests itself in the individual's propensity to select certain goals and to favor certain outcomes; it reflects individuals' preferences for particular types of desired end-states (Niemivirta, 2002b; Tuominen-Soini et al., 2008). Goal orientations are also connected to supportive and maintaining, as well as disturbing and preventive, impressions and beliefs of learning (Niemivirta, 2002a).

As Tuominen-Soini et al. (2010; 2012) write, traditionally there has been a division into two separate orientations in a learning situation: mastery orientation, in which students tend to emphasize learning and mastering knowledge, and performance orientation, in which students are driven by achievements. Tuominen-Soini et al. (2008; 2012) continue that all students do not actively try to learn, but actually try to survive studies with a minimum workload. This passive approach is called avoidance orientation.

Elliot and Harackiewicz (1996) divided the performance orientation into performance-approach orientation and performance-avoidance orientation. *Performance-approach orientation* is directed at demonstrating competence (Elliot & Harackiewicz, 1996; Tuominen-Soini et al., 2011, 2012). It reflects a student's endeavor to succeed in respect to other students and to show competence (Tuominen-Soini et al., 2010). Performance-approach goals may have a positive effect on effort, persistence, and graded performance or achievement, but the pursuit of such goals may also be associated with anxiety, superficial processing and stress (Tuominen-Soini et al., 2008). Performance-approach orientation is a significant predictor of academic achievement. *Performance-avoidance orientation* in turn is directed at avoiding the demonstration of normative incompetence and public image of ineptness (Elliot & Harackiewicz, 1996; Elliot & Church, 1997; Tuominen-Soini et al., 2010, 2011, 2012). Performance-avoidance goals have been found to be linked with negative outcomes and indices of maladaptive adjustment, such as anxiety, hopelessness, superficial and disorganized study strategies, lower performance, self-concept and self-efficacy, and self-handicapping (Tuominen-Soini et al., 2008, 2010).

Mastery orientation has also been divided into two more specific orientations: mastery-extrinsic orientation and mastery-intrinsic orientation. Tuominen-Soini et al. (2012) write that students with *mastery-extrinsic orientation* have a tendency of relying on external criteria as source of motivation. They continue that these students seek to master school subjects and focus on absolute success. Students with mastery-extrinsic orientation tend to use external criteria such as grades or explicit feedback for evaluating whether one has attained the given goal of mastering a subject or learning a new thing (Tuominen-Soini et al., 2011). They add that these students focus on absolute success instead of relative success. According to Tuominen-Soini et al. (2010), mastery-extrinsic orientation is related to positive factors like experiencing the significance of school or good success in school, but it can also be related to negative factors like stress and emotional exhaustion. In their article Tuominen-Soini et al. (2008) state that mastery-extrinsic orientated students not only relate to mastery focused tendencies (e.g., active coping and effort expenditure) but also to performance-related concerns (e.g. fear of failure and excessive worrying). *Mastery-intrinsic orientation* has been less studied. Students with this orientation use intrinsic criteria (e.g. the phenomenological feeling of knowing and understanding) for evaluating whether they have achieved mastery or not (Tuominen-Soini et al., 2008).

The objective of students with *avoidance orientation* is effort reduction by avoiding challenging tasks, putting forth as little effort as possible and trying to get away with it (Tuominen-Soini et al., 2011; Tapola & Niemivirta, 2008). Tuominen-Soini et al. (2008, 2010) write that avoidance goals have been found to be associated with lower performance, interest and enjoyment, low or superficial use of strategy, alienation and cynical attitudes toward school, negative affects, and external attributional patterns.

The theory of achievement goal orientations suggests that the students with different achievement goal orientations differ from each other also in other motivational indices. The motivational indices which are linked with achievement goal orientations and used in this study are planning, executive approach, innovating approach, academic withdrawal, fear of failure, and studying. *Planning* in this context describes students' endeavor to plan different phases or issues related to studies beforehand (Niemivirta, 2002a). Executive and innovating approaches are orientations of thinking and problem-solving. *Executive approach* is a way to solve problems where guidance and structure are important. A student with executive approach wants to follow instructions and work using ready-made templates (Niemivirta, 2002a). A student with *innovating approach* solves problems using innovative thinking and new ideas. He/she is driven by a desire to create and apply new and different solutions to problems (Niemivirta, 2002a). *Academic withdrawal* is a tendency to give up or get paralyzed when facing challenging learning or performance situations (Niemivirta, 2002a, 2002b; Tapola & Niemivirta, 2008). *Fear of failure* in turn reflects the fear and anxiety to fail in studies

(Niemivirta, 2002a, 2002b; Tapola & Niemivirta, 2008). *Studying* implies what the student's impression is about the support he/she is getting from teachers and how well individuality has been taken into account in studies.

By classifying students according to their achievement goal orientations and additional motivational indices, it is possible to identify existing achievement goal orientation profiles. That gives a good starting point for finding those students who hover between giving up and continuing their studies, and for innovating new learning environments which could be of help, even small, to them.

## 2.2 Mobile Learning

Learning and teaching by using technology are wide areas to study. Distant learning crystallizes all those doctrines and directives where the teacher and student are physically apart from each other in place and time. Electronic learning is conducted by using computers, but it does not bring real freedom of choice. Mobile learning (m-learning) is carried out by using small, hand-held devices. These can be for example PDAs or mobile phones. So, mobile learning is not simply a variant of e-learning enacted with portable devices, nor an extension of classroom learning into less formal settings (Vavoula et al., 2009). As Pachler et al. (2010) state, m-learning is not about delivering content to mobile devices but, instead, about the processes of getting familiar with and being able to operate successfully in, and across, new and ever changing contexts and learning spaces. It is about understanding and knowing how to utilize our everyday-life worlds as learning spaces (ibid.).

By its very nature, anytime, anyplace learning assumes that the learners start with a need and a motivation for some information that will help them perform an immediate action (Metcalf, 2006). Learners should be able to engage in educational activities without the constraints of having to do so in a tightly delimited physical location (Kukulska-Hulme & Traxler, 2005). To a certain extent, learning outside a classroom or in various locations requires nothing more than the motivation to do so (ibid.).

## 3. METHOD

### 3.1 Participants and Context of the Study

All the participants were second grade engineering students from the Faculty of Technology or second grade ICT students from the Faculty of Business Studies in LUAS attending a compulsory course called "The basics of databases". In this research, two different course implementations were studied; autumns 2011 and 2012. The course included database planning with the entity-relationship model, relational design, normalization, transaction theory and database language SQL. The course was held in the beginning of the second academic year, and gives 3 credits. In order to get the credits, students needed to pass both the course examination and complete 3 out of 6 sets of mobile assignments (m-questionnaires). There was no grade limit in the mobile assignments. The results from mobile questionnaires made up 20% of the final course grade.

The motivation questionnaire instrument by Niemivirta (2002b) was used for assessing both achievement goal orientations and additional motivational indices. The questionnaire included items for both of them. For example, the question item for mastery-intrinsic orientation was "To acquire new knowledge is an important goal for me in school", the question item for mastery-extrinsic orientation was "My goal is to succeed in school" and the question item for avoidance orientation was "I try to avoid situations in which I might fail or make a mistake". Students rated all items using a 7-point Likert-type scale ranging from 1 (not true at all) to 7 (very true). In the autumn of 2011 the achievement goal orientation questionnaire was in paper form and in the autumn of 2012 the questionnaire was in the form of Google Docs Form. Answers were saved into IBM SPSS Statistics 20 software and into Mplus statistical modeling program.

In autumn 2011, 92 students, both full-time day students and mature students, participated in the course. It was possible to combine 63.0 % of these students (n=58) to the results from achievement goal orientation profiles study, as 30 students did not give their student number in the achievement goal orientation questionnaire. Four students dropped out of the course. In autumn 2012, 86 full-time day students participated in the course. 47.7 % of these students answered the achievements goal orientation questionnaire

(n=41). One student did not finish the course. The total number of students on these two course implementations were 173, of whom 99 (57.2 %) had an achievement goal orientation profile.

On the course the lecturer sent Google Docs Form links into mobile phones of those students who had one, and who were willing to pay for the telecommunications operators' bill themselves. Those students who had no smartphone or did not want to use their own phone, for some reason, were given an opportunity to use smartphones (Nokia N900) in the classroom during course lecturing.

Students were sent six different m-questionnaires, which were related to subjects discussed in the classroom. The maximum number of points, which was the total from all the m-questionnaires, was 30. Thus one m-questionnaire could give a maximum score of 5 points. In each m-questionnaire there were five different items to answer. The items were of check-box or radio-button type. Check-box items could have multiple choices to click - or none - for the right answer, whereas with radio-button there was only one choice. A wrong choice could give minus-points, though the minimum points from one item was zero. A new m-questionnaire was given every week. Originally the idea was to give only one week to answer every set of m-questionnaires, but students requested more time, so they were given several weeks to answer the m-questionnaires. The right answers were given before the course examination.

### 3.2 Measures and Data Analyses

The latent class analysis (LCA) was used for classifying students according to their responses to different achievement goal orientations. This analysis was performed using the Mplus statistical modeling program, version 7.11 (Muthén & Muthén, 1998-2012). Mplus offers Bayesian Information Criterion (BIC), Vuong-Lo-Mendell-Rubin likelihood ratio test (VLMR) and Lo-Mendell-Rubin adjusted LTR -test (LMR) in order to conclude which number of classes is the best choice (Lo et al., 2001). The lower the BIC value is, the better the model fits to the data. Low VLMR and LMR p-values indicate that the model with one class less is rejected in favor of the estimated model (Muthén & Muthén, 1998-2012).

The data from background variables were saved into IBM SPSS Statistics 20 file for statistical analysis about the students attending "The Basics of Databases": (1) *Achievement goal orientation profile* – the information about the student's achievement goal orientation profile (mastery-oriented, success-oriented, indifferent, avoidance-oriented, no profile); (2) *Gender* - whether the student was a man or a woman; (3) *Mature or full-time* - if she/he was a mature student or full-time day student; (4) *Degree programme* – student's degree programme, whether it was IT (Information Technology), MT (Media Technology) or ICT (Business Information Technology at the Faculty of Business Studies); (5) *Whose mobile phone* - if the mobile phone used was the student's own or owned by the Faculty of Technology; (7) *Number of answered m-questionnaires*; (8) *Grade from m-questionnaires* - the grade which the student got from mobile questionnaires and (9) *Grade from course examination*.

## 4. RESULTS

### 4.1 Achievement Goal Orientation Profiles

One goal of this study was to examine what kinds of achievement goal orientation profiles can be identified among students. Different numbers of classes were tested with LCA, and the information criteria values showed the four-class solution to fit the data best.

After finding the best fitting model, these four classes were given labels. Group labels were decided according to the score mean profiles as (1) *mastery-oriented*, (2) *success-oriented*, (3) *indifferent* and (4) *avoidance-oriented*. The students in the mastery-oriented group (n=24, 24.2%) have high scores in mastery-intrinsic orientation, but quite low scores on all other orientations. An important goal for them in school was to learn and understand as much as possible (Tuominen-Soini et. al, 2012, 2011, 2010, 2008). Success-oriented (n=51, 51.5%) students expressed high levels of both mastery orientations and performance-approach orientation. They seemingly strived for both absolute and relative success, although they considered the goal of learning and understanding important as well (Tuominen-Soini et. al, 2012, 2011, 2010, 2008). The students in the indifferent group (n=6, 6.1%) represented a typical student in the sample with their joint - yet weak - emphasis on mastery, performance, and avoidance. In other words, they did not display a

dominant tendency towards any specific achievement goal orientation (Tuominen-Soini et. al, 2012, 2011, 2010, 2008). Indifferent students had scores close to the sample mean on all achievement goal orientations (Tuominen-Soini et. al, 2012). Avoidance-oriented students ( $n=18$ , 18.2%) scored high on avoidance orientation and, in contrast, very low on mastery-intrinsic and mastery-extrinsic orientations. They mainly aimed at minimizing the effort and time spent on studying (Tuominen-Soini et al., 2012, 2011, 2010, 2008). (Tuominen-Soini et al., 2012, 2011, 2010, 2008, 2004; Niemivirta, 2002a, 2002b; Tapola & Niemivirta, 2008)

## 4.2 Correlations

A Pearson Product Moment Correlation (Holopainen & Pulkkinen, 2002; Metsämuuronen, 2002, 2006) was run to measure correlation between achievement goal orientation profiles and background variables (Table 1). There was statistically significant correlation ( $p < 0.01$ ) between both gender and full-time day student/mature student with degree programme. The correlation between degree programmes and mature/full-time day students is biased, as there are mature students only in the information technology degree programme, and not in the media technology or ICT degree programmes. The correlation between degree programmes and gender is also biased. There are only 10.2% women in information technology degree programme, 13.3% in ICT degree programme and 33.3% in media technology programme. A total of 83.8% of students ( $n=145$ ) in this study were men, and 16.2% were women ( $n=28$ ). The percentage of full-time day students was 93.6% ( $n=162$ ), and 6.4% were mature ( $n=11$ ) students. There was also a significant positive correlation between the number of answered m-questionnaires and the grade got from m-questionnaires. This is self-evident, as the more you answered m-questionnaires, the more you would get points from them.

Far more interesting were the correlations between orientation profile and grades from m-questionnaires (Table 1, Figure 1), and the correlations between gender and grades from m-questionnaires (Table 1). The positive significant correlation between grades from m-questionnaires and orientation profiles suggests that success-oriented students tended to get grades 2, 3 and 4 from m-questionnaire assignments, which somehow supports the theory of orientation profiles. Another noticeable observation in Figure 1 is that avoidance-oriented students have got grades 4 and 5 from m-questionnaires, as according to the theory of orientation profiles these grades should be in the other end of the grading scale. The correlation between grades from m-questionnaires and gender was statistically nearly significant ( $p < 0.05$ ). Women seemed to get a little bit better grades than men.

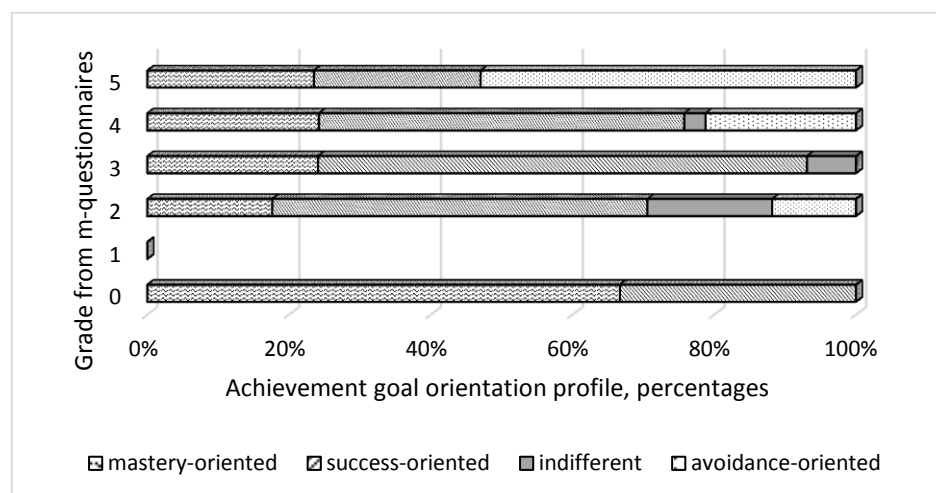


Figure 1. Graph about correlations between grade from m-questionnaires and achievement orientation profile.

Other interesting correlations were between the grade from the course examination and the achievement orientation profile (Table 1), and between the number of answered m-questionnaires and the grade from m-questionnaires (Table 1). The correlation was at a statistically nearly significant level between the grade from

the course examination and the orientation profile, showing a possible relation. The unexpected result is that students with the avoidance-oriented profile had got as good grades from the course examination as students in mastery- and success-oriented profiles. There were no fails among them, and not even grade 1, which could have been the expected result.

The correlation was statistically significant between the grade from the course examination and both the number of answered m-questionnaires and the grade from m-questionnaires (Figure2, Table 1). This implies that the effort made with m-questionnaires helps the student to pass and succeed in the course examination. Only 13 (9.6%) of those students who answered all 6 m-questionnaires (n=135) failed the course examination.

Table 1. Correlations between achievement orientation goal profiles and background variables

Variable	Achievement goal orientation profile	Gender	Mature or Full-time day student	Degree programme	Whose mobile phone	Nbr of answered m-questionnaires	Grade from m-questionnaires
Gender	-.19	-					
Mature or Full-time day student	-.16	.14	-				
Degree programme	.11	-.21**	.20**	-			
Whose mobile phone	-.11	-.01	.04	.05	-		
Nbr of answered m-questionnaires	.17	.12	-.07	-.11	.03	-	
Grade from m-questionnaires	.26**	.16*	.07	-.04	.13	.72**	-
Grade from course exam	.25*	.02	.03	.14	-.06	.24**	.37**

Note. \*p < .05, \*\*p < .01

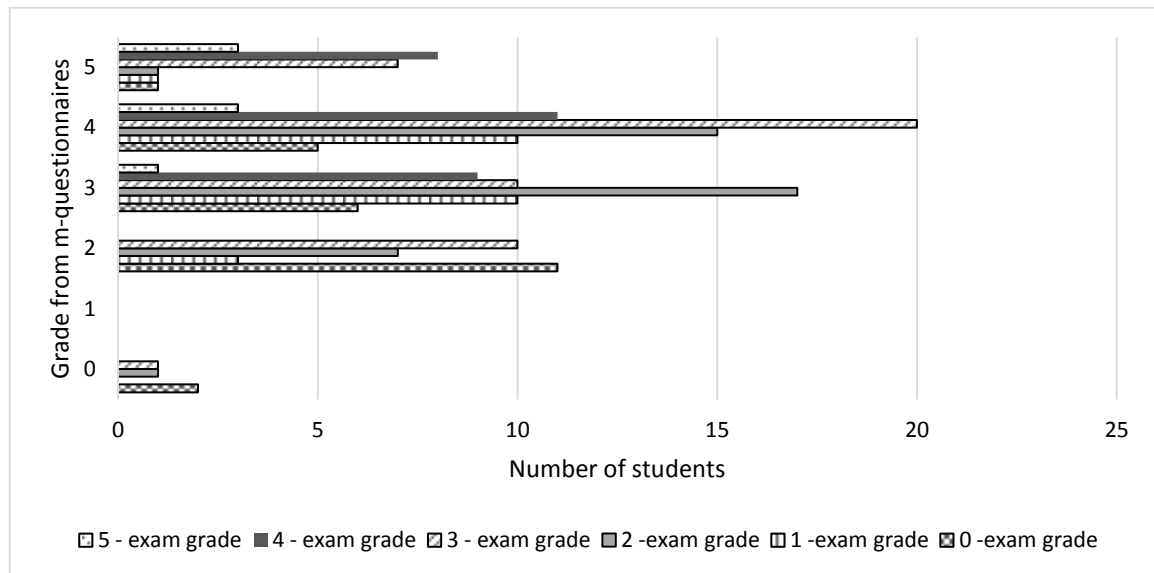


Figure 2. Graph about correlations between grade from course examination and grade from m-questionnaires.

## 5. CONCLUSION

In order to be able to help students who struggle with their motivation to study, those students need to be recognized first. The instrument developed by professor Niemivirta allows the researcher (lecturer) to identify different achievement goal orientation profiles among students, and hereby introduce pedagogical actions if needed. One possibility to encourage the students with low or negative motivation is to use learning spaces which differ from traditional learning environments. As the result of this research implies, students with an avoidance-oriented profile seem to benefit from mobile assignments. There was no correlation between avoidance-oriented students and the number of answered m-questionnaires, which means that they were just as eager to do mobile assignments as students in the mastery- and success-oriented profiles. As there was a statistically significant positive correlation between the number of answered m-questionnaires and the grade from the course examination, the profit from m-questionnaires seems to be even more valuable.

The results from the achievement goal orientation profiles must be interpreted with caution. As the basis of the profiles is a questionnaire, one must keep in mind that there is always room for error, when a student fills out the questionnaire. Has she/he understood the questions correctly, i.e. which end to choose from the Likert scale so that the answer is as close as possible to her/his opinion? Or what is the state of mind at the moment when the answers are ticked; should she/he choose 4, 5 or 6 from the Likert scale? However, whatever the orientation profile, according to the correlations of this research, mobile assignments seemed to be a suitable learning tool for everyone. The second aspect which must be considered with some reservations is the use of smartphones in the classroom situation. 75.7% of students used their own smartphone. Still, a quarter of the students used a smartphone the Faculty offered. It is not known if they did not have a smartphone or if they did not want to give their private phone number to the lecturer. Those 42 students who used Nokia N900 smartphones in the classroom were in a worse position than the others. They had no peace to do and think thoroughly about the mobile assignments as there was only a short time during the lessons for them. It was not possible to give Nokia N900 smartphones home, because their number was limited and they were needed constantly at the Faculty. If mobile learning environments become a constant tool for teaching, it must be ensured that every student has equal opportunity to do them. The third aspect to take notice of is that in this research no proper mobile learning environment tool or application was used, only Google Docs Form through web browser. The experience from mobile assignments might be totally different if a real mobile application were used.

In spite of its limitations this research suggests that mobile assignments could offer a useful tool to encourage students to study, especially those with motivational challenges.

## ACKNOWLEDGEMENTS

The author would like to thank Markku Niemivirta, who is a docent of educational psychology and professor of empirical educational sciences at the Institute of Behavioural Sciences, University of Helsinki, Finland, for giving his achievement goal orientation instrument into use.

The author would also like to thank Lauri Malmi, who is professor in Aalto University School of Science and Technology, Finland, at the Department of Computer Science and Engineering, for giving the necessary guidance and comments along the research process.

## REFERENCES

- Elliot, A.J. & Church, M.A. (1997). A Hierarchical Model of Approach and Avoidance Achievement Motivation. *Journal of Personality and Social Psychology*, Vol. 72, No. 1, 218-232.
- Elliot, A.J. & Harackiewicz, J.M. (1996). Approach and Avoidance Achievement Goals and Intrinsic Motivation: A Mediation Analysis. *Journal of Personality and Social Psychology*, Vol. 70, No. 3, 461-475.
- Holopainen, M. & Pulkkinen, P. (2002). *Tilastolliset menetelmät* [Statistical methods]. WSOY Oppimateriaalit Oy, Porvoo, Finland.
- Kukulka-Hulme, A. & Traxler, J. (eds.). (2005). *Mobile Learning: A handbook for educators and trainers*. London: Routledge.

- Lo, Y., Mendell, N.R. & Rubin, D.B. (2001). *Testing the number of components in a normal mixture*. Biometrika, Vol. 88, No. 3 (Sep., 2001), pp. 767-778.
- Metcalf, D. (2006). *mLearning, Mobile Learning and Performance in the Palm of Your Hand*. Amherst, MA: HRD Press, Inc.
- Metsämuuronen, J. (2002). *Tilastollisen kuvauksen perusteet* [The basics of statistical description]. Metodologia - sarja 2. International Methelp Ky, Sri Lanka.
- Metsämuuronen, J. (2006). *Tutkimuksen tekemisen perusteet ihmistieteissä* [The basics of statistical research in human sciences]. International Methelp Ky, Sri Lanka.
- Muthén, L.K. and Muthén, B.O. (1998-2012). *Mplus User's Guide*. Seventh Edition. Los Angeles, CA: Muthén & Muthén.
- Niemivirta, M. (2002a). *Valmiuksia, virikkeitä vai vaihtelua? Kansanopisto-opiskelijoiden motivaatio ja opiskelukokemukset* [Motivation and study experiences in Finnish folk high school](Arviointi 1/2002). Opetushallitus, Helsinki, Finland.
- Niemivirta, M. (2002b). Motivation and performance in context: The influence of goal orientations and instructional setting on situational appraisals and task performance. *Psychologia: An International Journal of Psychology in the Orient*, 45, 250-270.
- OSF 2009. Official Statistics of Finland (OSF): *Telecommunications [e-publication]*. 2008. Helsinki: Statistics Finland [referred: 26.9.2013]. Access method: [http://www.stat.fi/til/tvie/2008/tvie\\_2008\\_2009-06-09\\_tie\\_001\\_en.html](http://www.stat.fi/til/tvie/2008/tvie_2008_2009-06-09_tie_001_en.html).
- OSF 2013. Official Statistics of Finland (OSF): *Preliminary population statistics [e-publication]*. ISSN=2243-3627. August 2013. Helsinki: Statistics Finland [referred: 26.9.2013]. Access method: [http://www.tilastokeskus.fi/til/vamuu/2013/08/vamuu\\_2013\\_08\\_2013-09-19\\_tie\\_001\\_en.html](http://www.tilastokeskus.fi/til/vamuu/2013/08/vamuu_2013_08_2013-09-19_tie_001_en.html).
- Pachler, N., Bachmair, B. & Cook, J. (2010). *Mobile Learning. Structures, Agency, Practices*. Springer.
- Tapola, A. & Niemivirta, M. (2008). The role of achievement goal orientations in students' perceptions of and preferences for classroom environment. *British Journal of Educational Psychology*, 78, 291-312.
- Tuominen-Soini, H., Salmela-Aro, K. & Niemivirta, M. (2008). Achievement goal orientations and subjective well-being: A person-centered analysis. *Learning and Instruction*, 18, 251-266.
- Tuominen-Soini, H., Salmela-Aro, K. & Niemivirta, M. (2010). Ajallinen pysyvyys ja sukupuolierot nuorten opiskelumotivaatiossa [Temporary stability and gender differences in young people's studying motivation]. *Psykologia*, 45, (05-06), 386-401.
- Tuominen-Soini, H., Salmela-Aro, K. & Niemivirta, M. (2011). Stability and change in achievement goal orientation: A person-centered approach. *Contemporary Educational Psychology*, 36 (2011), 82-100.
- Tuominen-Soini, H., Salmela-Aro, K. & Niemivirta, M. (2012). Achievement goal orientations and academic well-being across the transition to upper secondary education. *Learning and Individual Differences*, 22, 290-305.
- Vavoula, G., Pachler, N. & Kukulska-Hulme, A. (eds.). 2009. *Researching mobile learning: Frameworks, methods and research design*. Oxford: Peter Lang.
- Veijalainen, T., Horn, S. & Hyytiäinen, J-T. (2013). *Lahti University of Applied Sciences presentation at University of Baltimore, USA, 24<sup>th</sup> of April, 2013*.